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# THE JOURNAL OF PHILOSOPHY

## PSYCHOLOGY AND SCIENTIFIC METHODS

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### RITTER'S ORGANISMAL CONCEPTION OF LIFE

RITTER'S *Unity of the Organism*, the first of the three titles listed below,<sup>1</sup> is a work which calls, I think, for special attention from students of philosophy. The work embodies, on the one hand, a notable contribution to the philosophy of the organism, from the point of view of a fairly extensive acquaintance with the literature of philosophy; and at the same time an acutely critical review of the facts and tendencies—with attention centered upon the facts—developed in the past generation of biology. The two smaller volumes throw very interesting side-lights upon Ritter's philosophy. They are full of suggestions for the philosopher, but they strike one as desultory and unfinished. *The Unity of the Organism* bears the marks of years of thoughtful preparation. Ritter is everywhere agreeable reading. His style is frankly and easily personal, free from all scientific pedantry, and his criticisms, severe and outspoken, are always good-natured.

The organismal conception of life is developed by contrast with the various "elemental" theories so prominent in the biological thought of twenty years past. Under elemental theories Ritter includes not only those which regard the organism as a mechanical aggregate of elementary units, *e. g.*, as a mosaic of cells, but any theory which, like the germ-plasm theory, or the chromatin theory of inheritance, treats one "element" of the organism as more real or more determining than any other. To all such Ritter opposes "the unity of the organism," the determination of everything by "the organism as a whole;" which is not a name, but a thing, not a group, but an individual; at least as real and as determining in itself as any distinguishable "element."

<sup>1</sup> *The Unity of the Organism or the Organismal Conception of Life*. WILLIAM EMERSON RITTER, Director of the Scripps Institution for Biological Research of the University of California, La Jolla, California. Boston: Richard G. Badger. 1919. 2 vols. Pp. xxv + 806.

*The Probable Infinity of Nature and Life. Three Essays*. WILLIAM EMERSON RITTER. Boston: Richard G. Badger. 1918. Pp. 164.

*The Higher Usefulness of Science and Other Essays*. WILLIAM EMERSON RITTER. Boston: Richard G. Badger. 1918. Pp. 146.

Thus the unity of the organism comes to mean, even more distinctly, the uniqueness of the organism, and, in the last analysis, of the individual organism. Ritter's idea, for which he claims the support of histology and biochemistry, is that every tissue and every chemical reaction, whatever general features it may have, is also characteristic, not only of the species in question, but of the individual. There is no protoplasm, he maintains, but only *protoplasms*. And this means, carried further, that the unity of the organism is the unity of the *living* organism. Nothing is more insistently emphasized throughout the two volumes than the difference—a difference that must be conceived to extend to every detail of composition and structure—between the living and the dead animal. That the zoologist of to-day, a laboratory zoologist, is mainly a student of dead animals, is food, not for humor merely, but for thought. The Cartesian problem of mind and body seems to be based upon the dead body; as commonly conceived, it is a problem of mind and corpse. And biochemistry—from which, indeed, Ritter derives his own conception of the organism as a chemical laboratory and as a chemical element—is also mainly an analysis of dead animals, or at best of the dead products of the living. “The naturalist accepts not only without hesitation but with eagerness and gratitude the chemist's report on what he *is able to get out of the organism*,” but, “knowing as he does something of the methods by which the chemist gets at the chemical substances of organisms,” he can not suppose that the chemist's reports “come near setting forth what the organism *actually is*.”

Ritter speaks here as “the naturalist.” This term embodies comprehensively his personal philosophy and his conception of the scientific attitude. Speaking always as a scientist, he holds that the scientific attitude is represented more truly by Darwin than, say, by Loeb; by contact with nature in the field than by mere laboratory analysis; and, incidentally, by breadth of view than by narrow specialism. Elementalism, issuing in a mechanical and materialistic theory of life, is the consequence of supposing that the products of the laboratory are exclusively real. The result is not science, but “metaphysics.”<sup>2</sup> Science in the true sense is based upon a comprehensive observation of fact. And therefore—the laboratory preju-

<sup>2</sup> Ritter supposes that his own method is free from metaphysics. Yet as a programme for description he postulates the distinction between attributes of individuation and attributes of relation (*The Probable Infinity of Nature and Life*, p. 72), and all of his thinking seems to imply that the world is made up of things and their relations and not merely of groups of elementary attributes, or “phenomena”—clearly a metaphysical proposition. To my mind it is about as possible to eliminate metaphysics from thought as to eliminate respiration from life.

dice to the contrary—nothing is more worthily or more importantly scientific than the work of description and classification.

One is prepared, then, to learn that, as a Darwinian in science, Ritter is an Aristotelian in philosophy. He makes the suggestion—very fruitful, I think, for an interpretation of the Aristotelian metaphysics—that Aristotle was primarily a zoologist; and I should say that Ritter's whole work is, both in the aspects emphasized and in the difficulties neglected, a characteristic expression of the Aristotelian point of view in science. The keynote is a radical empiricism, recalling in its freedom from logical and scientific convention that of William James, which will decline, if possible, to treat any aspect of experience as less real than any other. It is radical empiricism that he opposes to elementalism. For he is equally opposed to vitalism. In Ritter's view Driesch's *entelechy* (in spite of the derivation from Aristotle) is no less an abstraction than Weissmann's *germ-plasm*. It represents an attempt to explain the phenomena of life by something less than the organism as a whole.

It is not easy to convey in summary the effect of an argument involving such a mass of detail and so much shrewd suggestion. Among the elemental theories refuted are: the Weissmann theory of an independent and all-determining *germ-plasm*; the theory which makes the organism merely an aggregate of chemical substances and processes; the theory of a universal *protoplasm*; the cell-theory, which explains the organism as a mosaic of "simple" cells; the *chromatin* theory, in which the chromatin of the chromosomes is treated as the sole "hereditary substance;" the theory that internal secretions are "formative stuffs;" and the Loeb theory which conceives the nervous system as an aggregate of originally independent, chemical "tropisms." Ritter is not slow to recognize the advances in biological knowledge which have been stimulated by these elemental hypotheses; his point is that none of the elements can be regarded as the "key" to the organism or in any exclusive sense as a carrier of heredity. It is the "nothing but" aspect of the elemental theories which he mainly contests. And the very idea of a "carrier of heredity" he is disposed to condemn as a superstition akin to *phlogiston*. Granting that a starfish produces an egg and that the egg gives rise to another starfish, does any biologist think that only a sufficiently powerful microscope is needed to enable him to see something in the egg "carrying" all of the innumerable characters of the adult starfish? What he might expect to see would be certain structural features peculiar to the starfish at the egg-stage of the individual's life; which would then disappear and be supplemented by other features peculiar to the embryonal stage—and so on (I., 224). In brief, re-

garded as an observed fact, heredity—which, by the way, applies not to adult characters solely but equally to those of every stage—is a process of transformation, not of transmission.

To the Weissmann theory which, on behalf of the continuity of germ-plasm from generation to generation, seems to call for the independence of the germ-layers and the origination of sex-cells in the outer layer, he opposes, among other observations, the appearance of sex-cells in the endoderm of hydroids; and Weissmann's attempt to account for this by "migration" he characterizes as a curious "example of the effect on the observing powers of the germ-plasm type of speculation." To the chemical theory, which makes the organism a chemical *product*, he replies by pointing out that each organism is a chemical *laboratory*, manufacturing its own specific product—as shown by differences of odor in plants and animals, by Reichert and Brown's results on hemoglobin, by the precipitin reaction as between bloods of different animals, by the "comparative chemistry" of the sperm of fishes, of milk, of digestive enzymes, *etc.* His extensive and (to the outsider, at least) very instructive examination of the cell theory is devoted to showing, mainly through a discussion of observational evidence, that the cell is peculiar to the organism and always the product of an organism, never a prior and independent unit; that the unicellular organism is still an organism (its "simplicity" being an exaggeration on behalf of a supposed pedagogical convenience), and the egg an organism in the unicellular stage; and that the attempt to treat protista as cells results only in showing, if anything, that beings much smaller and considerably simpler than cells existed long before cells.

The most extended treatment is accorded to the chromatin theory; which supplants the cell theory. Adopting Castle's definition of heredity, which defines heredity simply as "organic resemblance based upon descent," Ritter does not deny that "*to some extent* resemblance between ancestors and progeny is *in some way* connected with chromosomes." Not many of the major theories of biology are more securely established than the chromosome theory. His contention, however, is—based upon a lengthy examination of the evidence from protozoans, from the metazoan germ-cells, and from somatic histogenesis in multicellular organisms—that the cytoplasm, as well as the nucleus as a whole, is no less responsible; and that the inheritance materials of germ-cells are initiators rather than determiners of heredity.

The same mode of argument is applied to the theory of internal secretions. For example, as bearing upon the metamorphosis of the tadpole into the frog, "the truth appears to be that thyroid sub-

stance is organ-forming in much the same sense that water is organ-forming for the leaves, flowers, and fruit of the squash vine. . . . That is, an under-supply of water has an effect upon immature plants similar to that of an over-supply of thyroid substances upon immature frogs, namely, that of retarding growth and hastening metamorphosis. . . . Thyroid substance is organ-forming only through being organ-transforming" (II., 145). Again, his point is, with Sherrington against Loeb, that the simple reflex arc is an abstraction. "No one should be beguiled into the notion that the readily observed facts of ontogeny of the nervous system, the various processes, dendrites, and axones, do actually grow out on nerve cells and bring cells into connection with one another and with receptor and effector cells, and that a functional coordination is thus finally reached [which] does not exist in any way or degree in the early stages" (II., 169). "Every specific act of every part of the nervous system is primarily in the interest of some other part and function of the organism than itself" (II., 184). Even the antagonisms between reflexes (which, by the way, never lead to the disruption of the organism) are "constitutive of the normal organism. Even the most pronounced of them are yet in the interest of the organism as a whole" (II., 324). In passing from neural to psychical integration we find him—precisely in line with his general position—with the apperceptional as against the associational, or elemental school, standing for the rôle of mental activity in the development of thought.

Ritter's constructive argument, the main lines of which have been already suggested, consists chiefly of evidence for integration, *i. e.*, the influence of the organism as a whole in the production of each part, distinguished under the heads of growth integration, chemico-functional, neural, and psychical integration. Very interesting is the chapter on growth integration, in which he points to the existence in all growth of graded series of parts or processes (illustrated most simply in the tapering of a leaf or of the skeleton of a python) and calls to his aid Child's demonstration of "axial metabolic gradients," *i. e.*, gradients in rate of cell division, size of cells, rate of growth, and rate and sequence of differentiation, which are definitely related to the axes of the individual or its parts.

But the most striking feature of the organismal theory is the organismal conception (admittedly hypothetical) of consciousness. Among the several elemental theories, that with which Ritter seems chiefly concerned to come to terms is the chemical theory. That every organic process is a chemical process is treated as indisputable. But if so, how are we to attribute a real unity, implying individual-

ity and creativeness, to the organism as a whole? A reply already given is that the organism is itself a chemical laboratory; not a product, but a source of chemical change. Along the same line, the organismal theory of consciousness holds that each living organism has the value, chemically, of an elementary substance. To make the meaning of this clear, Ritter explains that fundamentally, from its beginnings in alchemy, chemistry is a study, not of the composition of things, but of their transformation. Hydrogen unites with oxygen so as to produce new attributes not prefigured in either element. Hydrogen is thus creative. And thus also the organism. From the chemical standpoint, the fundamental aspect of all life, as conceived by Ritter, is the transformation effected by the organism through contact with the gases of the air, as typified by respiration. In this process are created all of those attributes, physical or mental, which we call "life."

Such a creative transformation, for example, is knowledge. Ritter quotes the question raised by Hume: how can I infer the "secret power" of nourishment from the sensible attributes of bread? Or, from one instance of nutrition how can I infer another? What is the "medium" of inference? Ritter replies that the medium of inference, and the source of the "secret power," is the individual organism reacting in an enormous complexity of ways—mostly revealed by natural science since Hume—with the respiratory substance it takes in (II., 301). And thus he accords a certain justification to the Cartesian theory of innate ideas, in the sense, however, of hereditary potentialities. This is not to say that knowledge is merely subjective—no more, perhaps, than water is subjective to hydrogen. Knowledge is a process of transformation involving both subject and object, both knower and known.

Ritter calls this a conception of "consciousness." What it undertakes to make intelligible is the possibility of individuality and creativeness in something chemically constituted. It seems to me, however, that the question confronting a theory of *consciousness* is rather this: When hydrogen effects, with oxygen, a transformation into water, we can ask how it *looks* to the observing chemist; we can not (in the view of science and most common sense) ask how it *feels* from the point of view of hydrogen. Of any human activity we can ask both questions. How are we to explain the difference? Ritter's reply would be, I think, a refusal to assent to the current separation of the "inner" and "outer" aspects of life. At least it seems that, throughout the organic world, an inner aspect exists for every outer. For "the psychical aspect" is not restricted to the nervous system: it is everywhere "latent," at least, in "the breath of life," that is,

wherever there is a chemical reaction of an organism with the gaseous constituents of the air (II., 303). But the whole organismal conception seems to imply an essential continuity of organic and inorganic. All creativeness, Ritter tells us, chemical creativeness with the rest, is known "through being in our own deepest natures creative" (II., 295). And he more than once derides the scientist who thinks that the epithet of "anthropomorphism" is an answer to an argument. It would seem, then, that the organismal conception points in the direction of panpsychism. At any rate, as against the idea that the higher stages of evolution contain "nothing but" what was found in the lower, Ritter holds that the higher are a fresh revelation of the nature of the lower.

And thus when we ask how the behavior of the organism as an element is to be related to the elements found in it by chemical analysis—how the "chemistry" of social and spiritual life is related to the chemistry of the laboratory—the answer is that "the psychic activities of men, particularly the imagination and the emotions, reveal the fact that carbon, oxygen, nitrogen, and the others, are infinite as to their attributes of relation, exactly as water reveals a few attributes of relation of oxygen and hydrogen, and as table salt reveals a few attributes of relation of sodium and chlorine." At least it is true "that we have experimental evidence of their possessing a vast amount and variety of energy, and no ground whatever excepting the limitations of our momentary laboratory information about the substances, that the number and measure of their energies is limited."<sup>3</sup> If, in other words, the organic phenomena are chemical, and if also they are really organic and spiritual activities of real individuals, then it must be that the chemical properties of substances are only very partially revealed in the chemical laboratory.

Such is the biological outcome of a "naturalistic" point of view, *i. e.*, of a thoroughgoing empiricism, which accepts as real whatever is found in observation and refuses to be bound by pre-determined criteria of reality. Ritter's book suggests many questions, of which I will point to only one. Ritter calls himself, very truly, I think, a "naturalist," but he is no less insistent in claiming to speak in the name of science. With all his strictures upon current scientific theories, he writes as one who believes that the only truth is the truth of science. Now, I find it rather difficult to identify "the scientific attitude" of to-day with an exclusive regard for the results of observation. Science, like the church, may be militant or triumphant. Science militant (more in evidence a generation ago) is quite pious in pleading only for "the modern spirit of free in-

<sup>3</sup> *The Probable Infinity of Nature and Life*, p. 124.



quiry." Science triumphant stands firmly for the "fundamental" truths, or laws (such as gravitation and the conservation of energy), established by the fathers. "Elementalism" is a case of science triumphant; it represents the claim of suzerainty on the part of the older sciences of physics and chemistry over the newer science of biology. Ritter's naturalistic logic is obviously militant. Yet he is none the less loyal to the law of conservation of energy, as a law established, seemingly, once for all.<sup>4</sup>

This raises the question that I have in mind: how is the organismal theory of life to be reconciled with the law of conservation of energy? It strikes me that this is the largest question that the organismal theory will have to meet, and I wonder therefore that the question is nowhere broached in *The Unity of the Organism*. In this question we have the biological version of the eternal problem of continuity and change. The organismal theory stands for the reality of growth and change—for "creativeness." The conservation-law evidently knows nothing of creativeness. All that it finds in nature is a *redistribution* of energies, elements, or what not, on the basis of a quantitative equality of antecedent and consequent. And positively it seems to reject creativeness. For any influence at work directing the redistribution towards an organic end would seem to imply some additional "energy" at work not subject to the conservation-law; and, therefore, not to be tolerated. Ritter speaks at times of the organism as if it were just such an additional agency; for example, when he is compelled to the "assumption that the organism 'taps' or unlocks energy attributes of the elements."<sup>5</sup> This looks very much like the repudiated Drieschian entelechy. But the question is just this: how will the unity of the organism dispense with an entelechy, or something of the sort, and yet avoid being wiped out by the conservation of energy?

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### TRUTH, VALUE AND BIOLOGY

I WAS delighted to learn from Professor Wells's article on "The Biological Foundations of Belief"<sup>1</sup> that he has "the habit of regarding all human questions from the biological point of view," and so has a fundamental point of agreement with me. For if he is right in thinking so, we may be able to cooperate further in the discussion of the important question of the biological control of human beliefs.

<sup>4</sup> *The Probable Infinity of Nature and Life*, p. 77.

<sup>5</sup> *The Probable Infinity of Nature and Life*, p. 92.

<sup>1</sup> In this JOURNAL, XVI., p. 259.